

FIG. 1 prior art

①	Load	r8,	0x1000
②	Load	r9,	0x1500
③	Store	r10,	0x1760
④	Load	r11,	0x1840
⑤	Load	r12,	0x1760

the same address

instructions (1), (2) and (4) : no dependency : replaceable

instructions (3) and (5) : dependency : the order (3) → (5)

examples of replacing

③. ①. ②. ④. ⑤ ①. ②. ④. ③. ⑤

FIG. 2 prior art

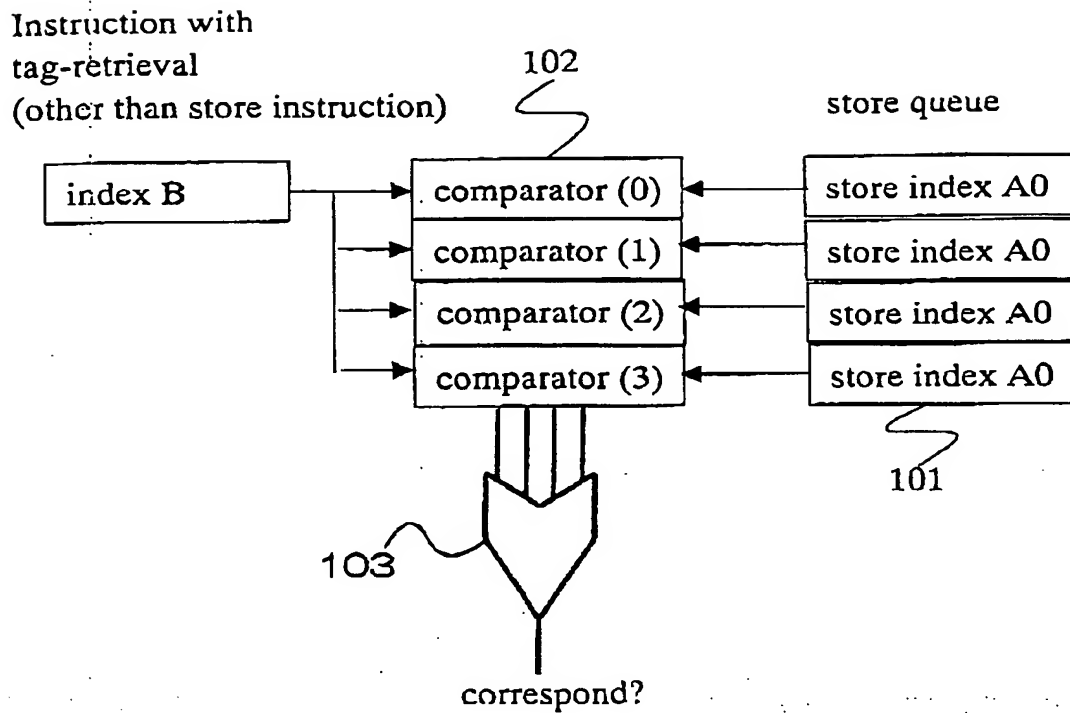


FIG. 3 prior art

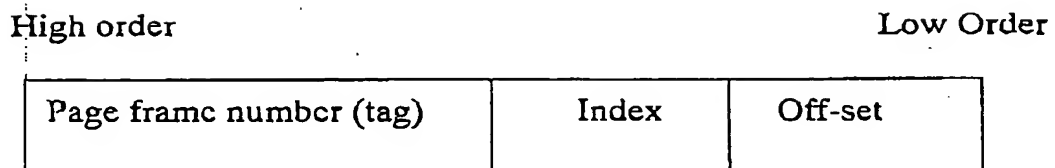


FIG. 4 prior art

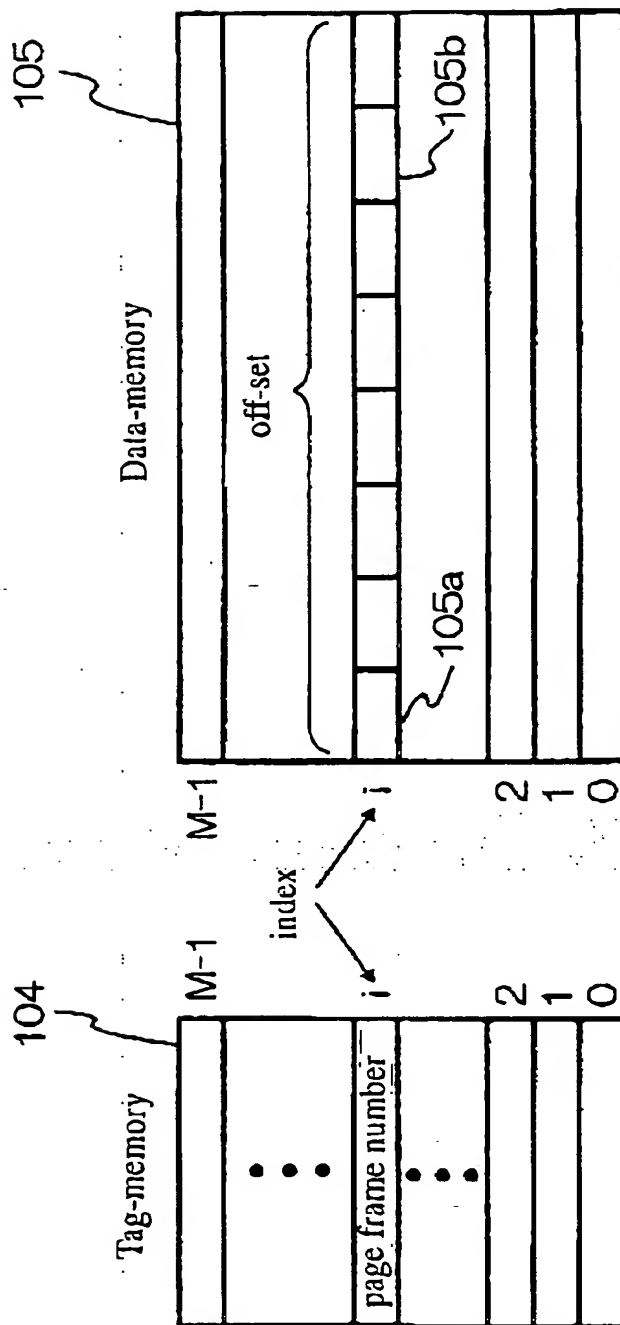
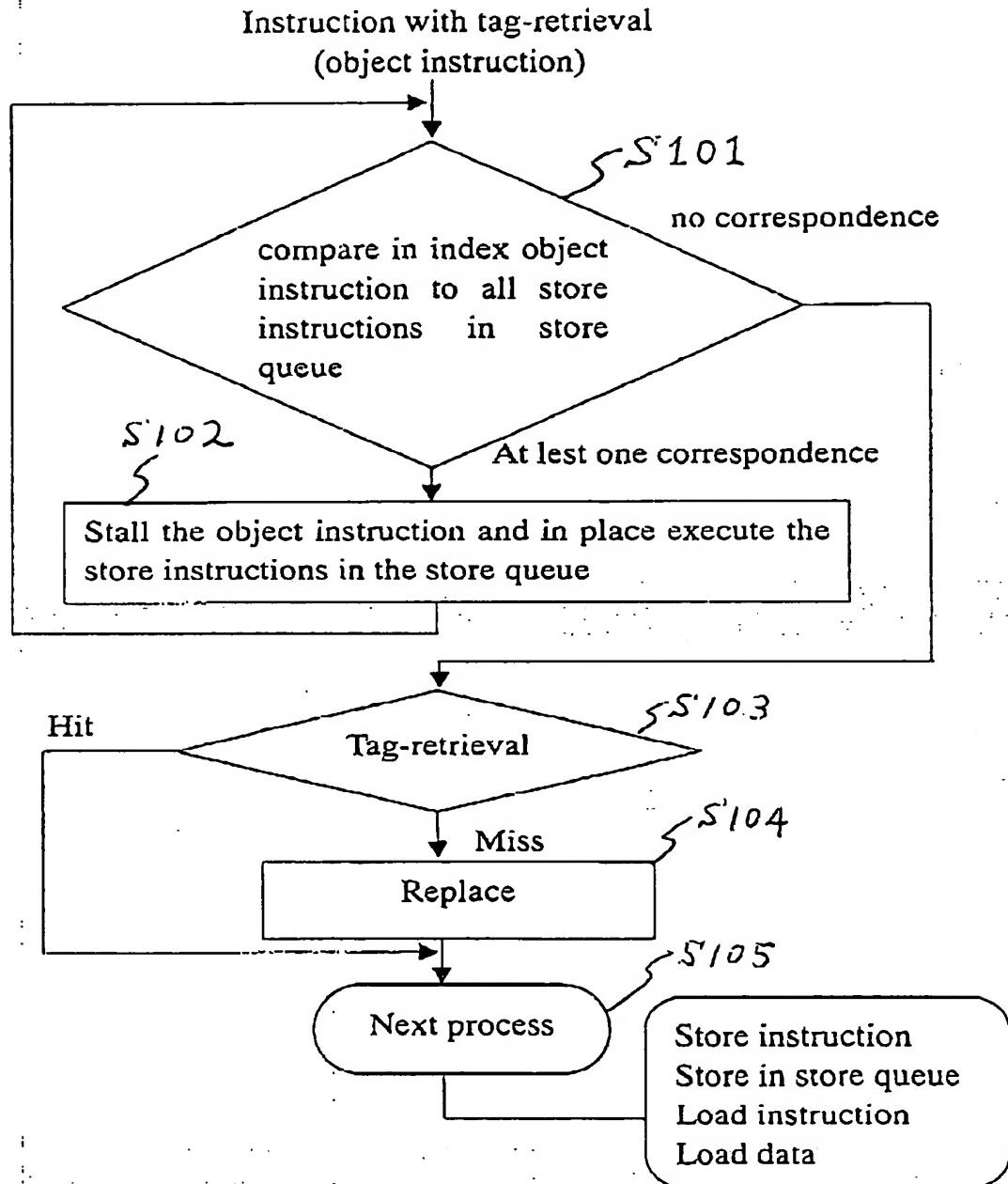


FIG. 5 prior art



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FIG. 6

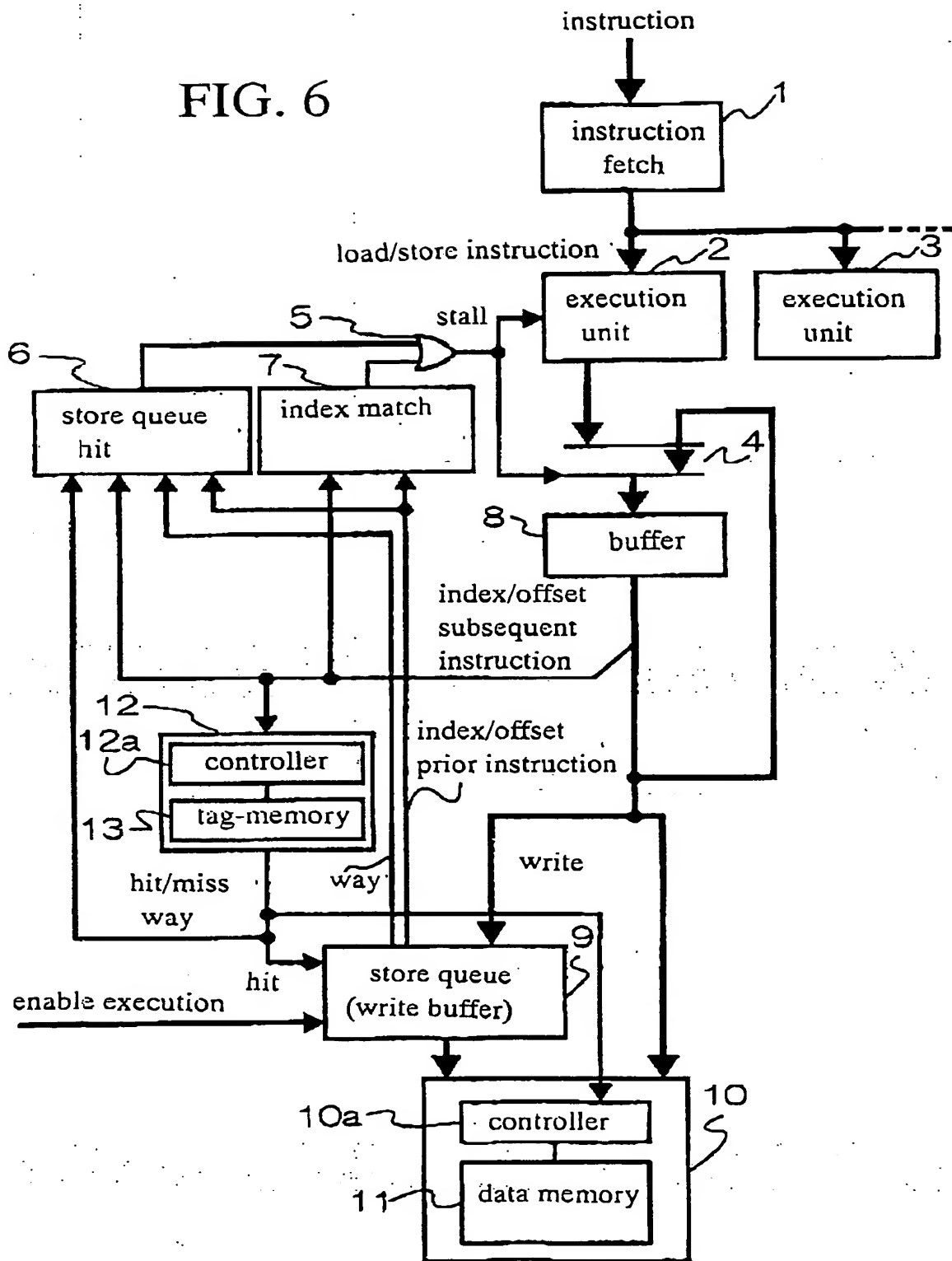


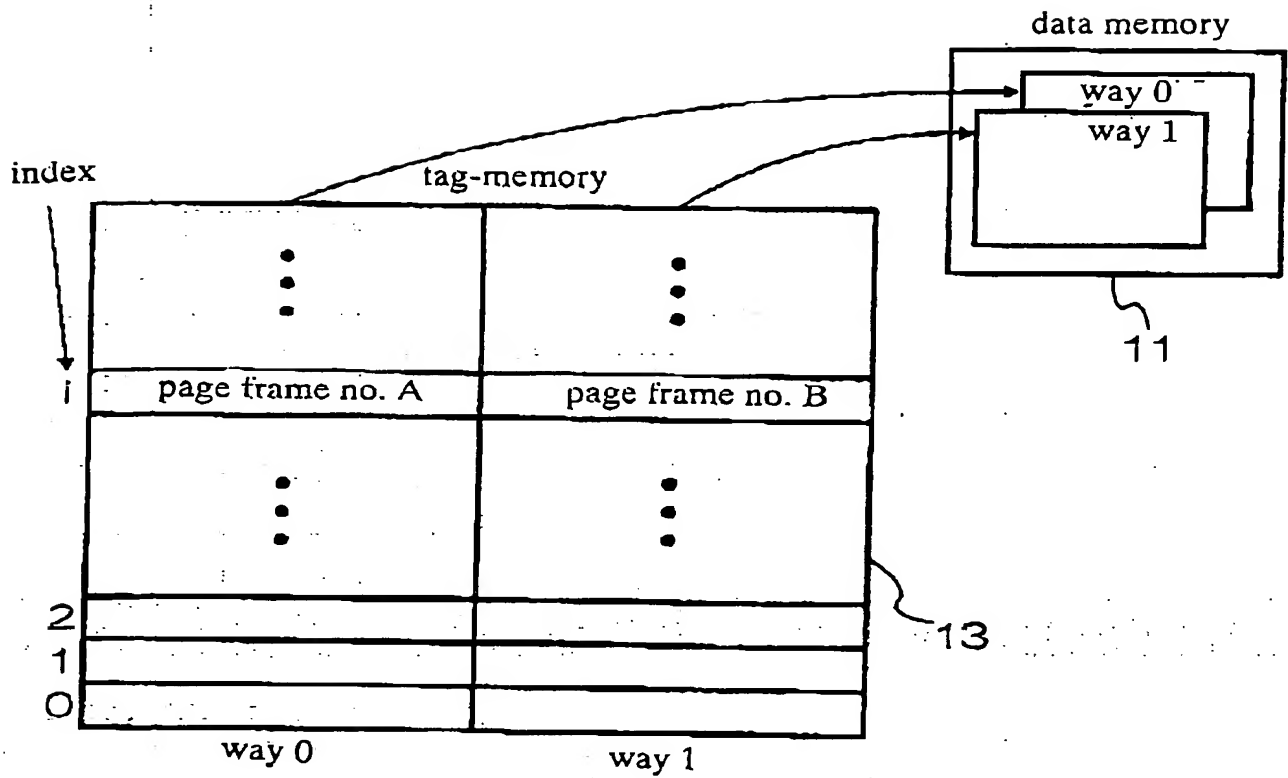
FIG. 7

9

ID	page frame number	index	off-set	way	...
0					...
1					...
2					...
⋮	⋮	⋮	⋮	⋮	⋮
n-1					...

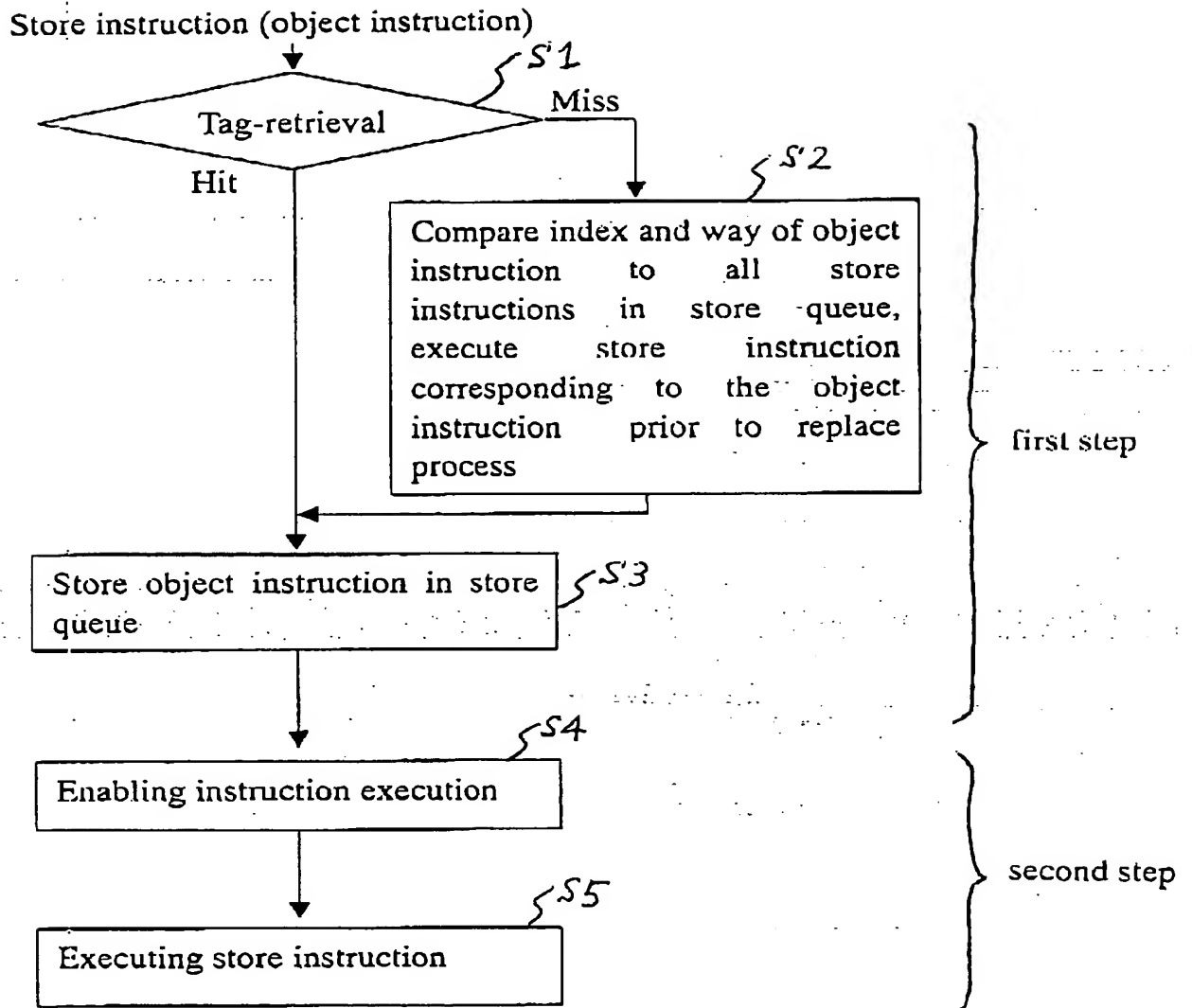
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FIG. 8



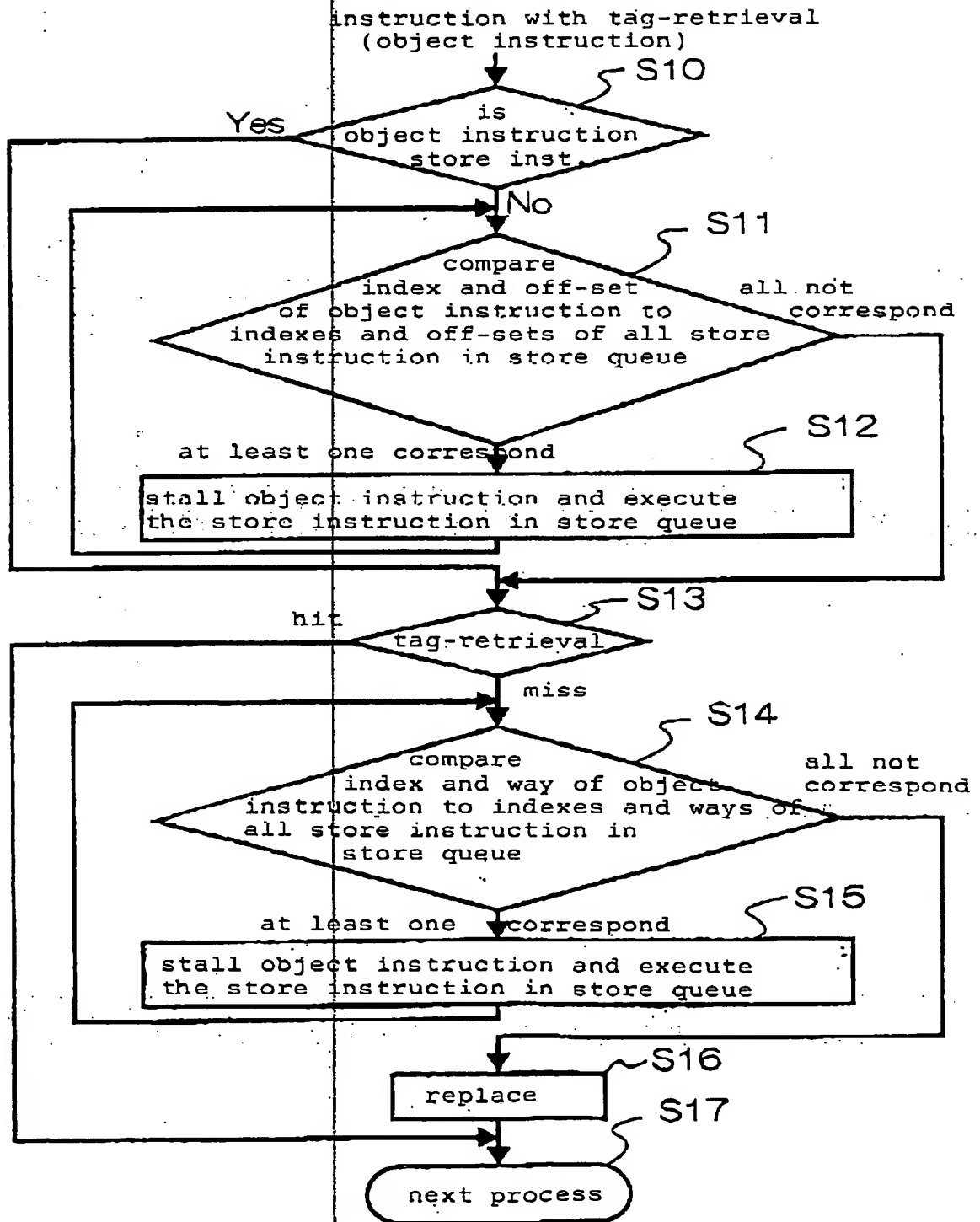
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FIG. 9



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FIG. 10



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FIG. 11

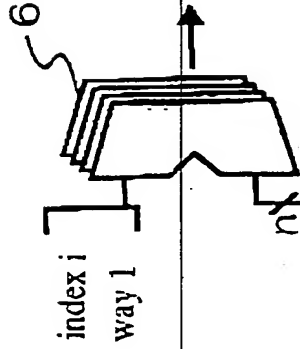
lag-memory

index

1	page frame no. A	page frame no. B

2		
1		
0		
	way 0	way 1

page frame no. A \neq page frame no. C
 page frame no. B \neq page frame no. C
 tag-retrieval : miss
 replace object : way = 1



ID	page frame no.	index	off-set	way	
0		i+1			...
1	page frame no. B	i	x	1	...
2	page frame no. A	i	y	0	...
...
n-1					...

load instruction
 page frame no. C
 index "y"
 off-set "z"

FIG. 12

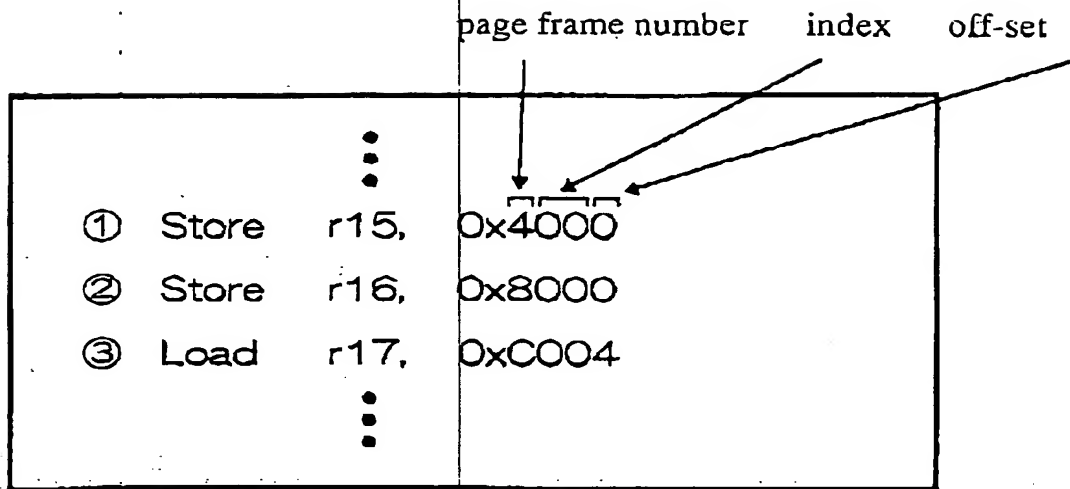


FIG. 13

			object way	way index "00" way 0 / way 1	result
a	① Store	tag-retrieval : miss	0	indefinite 8	0
b		replace	0	4 8	0
c	② Store	tag-retrieval : hit	1	4 8	0
d	③ Load	tag-retrieval : miss	0	4 8	1
e	① Store	write	0	4 8	1
f		replace (write-back + refill)	0	C 8	0

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FIG. 14A

① Store	r15.	Ox4000
② Load	r17.	Ox4128

FIG. 14B

① Store	r15.	Ox4000	→	way 0
② Store	r16.	Ox8000	→	way 1
③ Load	r17.	OxC004	→	way 0

FIG. 15A

- | | | | |
|---|-------|------|--------|
| ① | Store | r15, | 0x4000 |
| ② | Load | r17, | 0x4000 |

FIG. 15B

- | | | | |
|---|-------|------|--------|
| ① | Store | r15, | 0x4000 |
| ② | Load | r17, | 0x8000 |

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